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U. S. DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE
WATER SUPPLY OUTLOOK
FOR
MONTANA

and
FEDERAL-STATE-PRIVATE COOPERATIVE SNOW SURVEYS
Collaborating with
MONTANA AGRICULTURAL EXPERIMENT STATION

AS OF
FEB. 1, 1981

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
P.O. Box 98
BOZEMAN, MONTANA 59715
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SOIL CONSERVATION SERVICE
P.O. Box 98
Bozeman, Montana 59715

SNOTEL UPDATE

Radio telemetry equipment was installed at 18 SNOTEL sites last fall. This brings the number of sites in Montana that are reporting daily information on snow water equivalent, precipitation and temperature to 63.

Solar panels that convert the sun's energy to electrical energy provide power. When the site receives a signal to report, it transmits data from the site as well as the battery voltage. The signal is reflected from ionized meteor trails high above the earth's surface back to the master stations located at Boise, Idaho, and Ogden, Utah. Data from these master stations is sent over telephone lines to the computer in Portland, Oregon, where it is converted to engineering units. Cooperators and Snow Survey offices obtain SNOTEL data by telephoning the computer and extracting the data on CRT terminals and printers.

Many cooperators are now accessing data from the SNOTEL system. Data is being used by many Federal and State agencies, power companies, universities and others. In addition to monitoring the potential water supply and any changes that may affect the runoff, data is being used for evaluating avalanche potential, determining intensity of storms and the area covered, and general information on mountain weather.

Even with this automation, manual measurements will continue to be an important portion of the basic data for many years to come. There may be some reduction in the total number of surveys made, especially early and late season, but all snow courses will probably be measured at least once or twice per season.

Those who have a need to obtain SNOTEL data on a regular basis can request authorization from:

Van K Haderlie
State Conservationist
Soil Conservation Service
P. O. Box 970
Bozeman, MT 59715

Those who have a special need or occasional request may contact the Snow Survey Unit in Bozeman for data.

The Portland computer can store up to 3 months of data from the 500 sites in the western United States. Data older than 3 months is stored at the USDA Computer Center in Fort Collins, Colorado.

STATEWIDE OUTLOOK



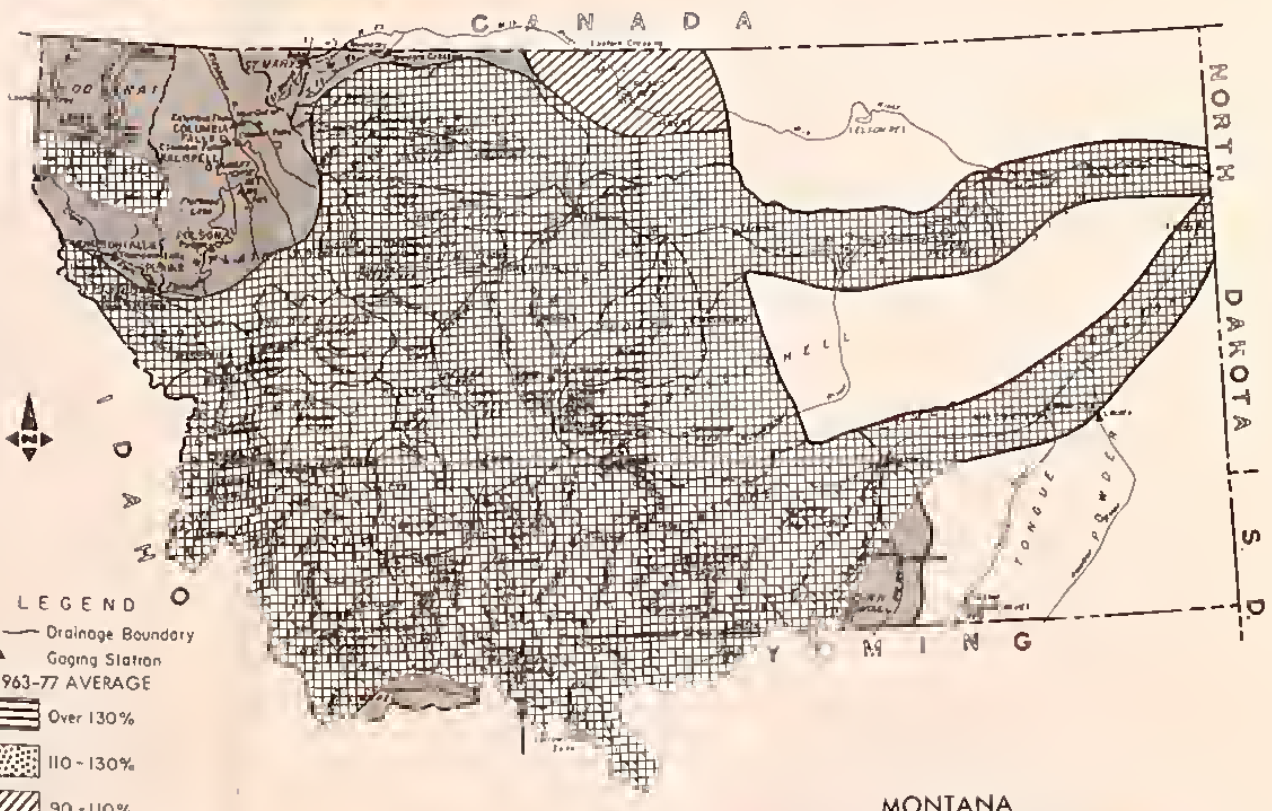
MOUNTAIN SNOWPACK

Snowpack conditions on the mountain watersheds of Montana deteriorated during January. Some snow fell during the last week of the month, but the lack of precipitation for the first three weeks left the total accumulation for January well below average. Temperatures were well above normal.

The snow drought covers the entire state. Most areas now have 40 to 50 percent of average snowpack. Nearly one-half of the snow courses measured show a record low water content for this date. Many snow course records extend back to the mid 1930's.

The area along the Canadian border from Glacier National Park westward has a little better snowpack than does the rest of the state. Snow cover in British Columbia in the Flathead and Kootenai River drainages is nearer average. Conditions are not expected to improve in the near future. The National Weather Service's outlook for February predicts above normal temperatures and below normal precipitation.

Near the first of March, all of the snow courses will be measured. The conditions found at that time will determine the extent of this season's snow shortage and the impact it will have on this spring and summer's water supply.



MONTANA PROSPECTIVE STREAMFLOW FORECASTS

STREAMFLOW FORECASTS

Almost all streams in the state are forecast to produce 60 to 70 percent of their average runoff this spring and summer. Moderate to severe shortages are expected to occur on almost all drainages except for the Kootenai, Flathead, St. Mary's and Milk Rivers. Most reservoirs have average or above

average storage which will help minimize some problems created by the low runoff. Irrigators and others who depend on streamflow as a source of water should begin thinking of ways to adjust operations to reduce the impact from a deficient water supply.



Columbia River Drainage

STREAMFLOW FORECASTS

DRAINAGE BASIN and/or FORECAST POINT	THIS YEAR				PAST RECORD				THIS YEAR				PAST RECORD			
	FORECAST		PAST RECORD		FORECAST		PAST RECORD		FORECAST		PAST RECORD		FORECAST		PAST RECORD	
	Thousand Feet	Percent of Average	Thousand Feet	Percent of Average	Thousand Feet	Percent of Average	Thousand Feet	Percent of Average	Thousand Feet	Percent of Average	Thousand Feet	Percent of Average	Thousand Feet	Percent of Average	Thousand Feet	Percent of Average
PERIOD	APRIL - SEPTEMBER				APRIL - JULY				APRIL - JUNE				APRIL - JUNE			
KOOTENAI RIVER below Libby Dam.....	6,250	90	6,221	7,246	5,560	90	5,429	6,178								
FISHER RIVER near Libby.....	145	54		240	135	53		253								
YAKA RIVER near Troy.....	420	78		537	395	77		514								
KOOTENAI RIVER at Leona (1).....	7,280	82	7,670	8,883	6,340	82	6,771	7,727	5,040	82	5,944	6,150				
INFLOW MOUTON RESERVOIR at BUTTE (Million Gallons).....					145	51		387								
WARM SPRINGS CREEK at MEYERS DAM near Anaconda (2).....	35.0	69	29.6	50.7	29.0	70	23.5	41.2								
FLINT CREEK near Southern Cross (3).....	12.6	68	24.8	18.5	10.3	67	20.3	15.4								
FLINT CREEK below Boulder Creek (4).....	51.5	66		77.6	40.0	65		61.3								
INFLOW LOWER WILLOW CREEK RESERVOIR near Hall (5).....	10.1	60	13.0	16.9	9.5	59	12.2	16.0								
MIDDLE FORK ROCK CREEK near Philipsburg.....	51.5	65		78.8	46.0	65		71.1								
NEVADA CREEK at Finn.....	11.9	50		23.6	11.0	50		21.8								
BLACKFOOT RIVER near Bonner.....	690	68		1,017	610	66		920	520	65		794				
CLARK FORK RIVER above Milltown (6).....	585	69		843	510	70		730	430	70		613				
CLARK FORK RIVER above Missoula.....	1,275	69	1,929	1,859	1,120	68	1,730	1,651	950	67	1,474	1,408				
WEST FORK BITTERROOT RIVER near Conner (7).....	110	59		187	100	58		172								
BITTERROOT RIVER near Darby.....	365	61		602	335	61		552	295	61		480				
SKALKAHOO CREEK near Hamilton.....	39.8	69		57.4	34.5	69		49.8								
BURNT FORK CREEK near Stevensville.....	26.8	69		38.8	23.5	70		33.6								
BITTERROOT RIVER at Missoula (9).....	970	63		1,543	885	62		1,416	760	63		1,211				
CLARK FORK RIVER below Missoula.....	2,245	66		3,405	2,005	65		3,069	1,710	65		2,618				
CLARK FORK RIVER at St. Regis.....	2,970	66	4,348	4,521	2,670	65	3,938	4,078	2,270	65	3,418	3,492				
NORTH FORK FLATHEAD RIVER near Columbia Falls.....	1,600	81		1,969	1,450	81		1,782	1,220	81		1,498				
MIDDLE FORK FLATHEAD RIVER near West Glacier.....	1,520	80		1,911	1,420	81	1,576	1,750	1,200	82	1,412	1,470				
SOUTH FORK FLATHEAD RIVER near Columbia Falls.....	1,760	76		1,946	2,302	75	1,808	2,159	1,420	75	1,652	1,884				
FLATHEAD RIVER at Columbia Falls (10).....	5,000	79	5,391	6,330	4,650	80	4,903	5,827	4,000	81	4,443	4,064				
SWAN RIVER near Big Fork.....	510	75		681	450	76		596								
FLATHEAD RIVER near Polson (11).....	5,760	78	6,382	7,394	5,350	79	5,787	6,806	4,650	80	5,159	5,779				
CLARK FORK RIVER near Plains (11).....	8,930	72	11,550	12,340	8,120	72	10,462	11,222	6,850	72	9,163	9,507				
THOMPSON RIVER near Thompson Falls.....	182	69		263	160	68		234								
PROSPECT CREEK at Thompson Falls.....	90.0	63		143	85.0	64		133								
CLARK FORK RIVER at Whitehorse Rapids.....	9,740	71		13,781	8,850	71		12,519	7,500	71		10,633				

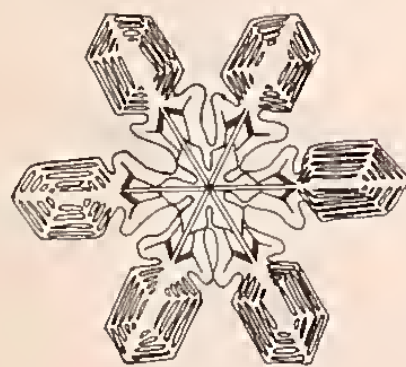
- Adjusted for storage in Lake Kootenai.
- Adjusted for storage in Silver Lake diversions to mill pumping from Georgetown Lake.
- Adjusted for storage in Georgetown Lake diversions from and pumping to Silver Lake.
- Sum of North Fork Lower Willow Creek near Hall and South Fork Lower Willow Creek near Hall.
- Difference in observed flow Clark Fork above Missoula and Blackfoot near Bonner.
- Adjusted for storage in Painted Rocks Reservoir.
- Adjusted for diversion into Sunset Highway Canal.
- Difference in observed flow Clark Fork above mill below Missoula.
- Adjusted for storage in Hungry Horse Reservoir.
- Adjusted for storage in Hungry Horse Reservoir and Flathead Lake.
- Adjusted for storage in Hungry Horse Reservoir, Flathead Lake and Necon Rapids Reservoir.

ALL FORECASTS PREPARED IN COOPERATION WITH THE NATIONAL WEATHER SERVICE

WATER SUPPLY OUTLOOK

WATER SUPPLY AREA	Soil Saturation	Low Period
Tobacco.....	Fair	Fair
Little Bitterroot.....	Fair	Poor
Mission Valley.....	Fair	Fair
Flint Creek.....	Fair	Poor
Upper Clark Fork.....	Fair	Poor
Nevada Creek.....	Fair	Poor
Blackfoot.....	Fair	Poor
West-side Bitterroot.....	Fair	Poor
East-side Bitterroot.....	Fair	Poor
Bitterroot River.....	Fair	Poor
Lower Clark Fork.....	Fair	Poor

Snow surveyors in Montana found a shallow snowpack at almost all snow courses surveyed this month.



MOUNTAIN SNOWPACK

Many snow courses are showing a record for water content. The water stored in the snowpack is generally 40 to 50 percent of average. The only exception is along the Canadian border in the Yaka River drainage and in Glacier National Park where snowpack is about 70 percent of average.

Very little moisture fell in the mountains during the first three weeks of January. Even though some storms moved through the area in late January, the total snowfall for the month was well below average.

Soils under the snowpack are generally wetter than average in the northern drainages and have near average moisture in the Bitterroot, Blackfoot and Clark Fork River drainages.

All of the snow courses will be measured near March 1. This data will provide a complete picture of the extent and severity of the snowpack shortage.

STREAMFLOW FORECASTS

Spring and summer streamflow forecasts have been reduced from last month because of low snowfall during January. In most drainages, the current forecast runoff has been lower in only 8 to 10 of the past 50 years.

Most drainages in the southern portion of the basin are expected to produce 60 to 70 percent of average runoff. Somewhat higher runoff is forecast for the Flathead and Kootenai Rivers.

Unless the weather patterns change drastically during the next two months, moderate to severe water shortages can be expected by late June in the Bitterroot, Blackfoot and Clark Fork River drainages. Those who depend on streamflow for their operations should begin thinking of ways to minimize the impact from low runoff.

SUMMARY OF SNOW MEASUREMENTS

RIVER BASIN and/or SUBWATERSHED	Number of Courses Sampled	THIS YEAR'S SNOW WATER AS PERCENT OF	
		LAST YEAR	AVERAGE
Kootenai/BC.....	18	92	86
Kootenai/Montana.....	5	83	63
Kootenai.....	23	90	79
Little Bitterroot.....	—	—	—
Flathead.....	20	84	63
Clark Fork above Blackfoot.....	19	75	51
Blackfoot.....	15	63	41
Clark Fork above Missoula.....	34	69	46
Bitterroot.....	8	72	53
Lower Clark Fork below Missoula.....	8	60	49
Clark Fork (Total w/o Flathead).....	50	67	49
Pend O'Reille (Clark Fork & Flathead).....	70	73	54
Columbia (Pend O'Reille & Kootenai).....	93	78	60

FEDERAL STATE PRIVATE COOPERATIVE SNOW SURVEYS

Established basic data necessary for forecasting water supply for irrigation, domestic and municipal use, hydroelectric power generation, navigation, moving and industry.

SNOW SURVEY DATA

SNOW February 1, 1981			THIS YEAR			PAST RECORD		
DRAINAGE BASIN and/or SNOW COURSE			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (Inches)		Average
NAME	Elevation	Last Year				April		
ARCH FALLS	7350	1/27	10	2.0	6.0	9.1		
BADGER PASS	6900	1/29	57	17.0A	23.5	29.5		
BADGER PASS FILLLOW	6900	2/01	SP	15.0	22.9	-		
BANFIELD MOUNTAIN	5600	2/03	32	10.6	13.4	18.2		
BANFIELD MOUNTAIN FILLLOW	5600	2/03	SP	10.5	11.8	15.2		
BARKER LAKES FILLLOW	8250	2/01	SP	7.7	-	-		
BASIN CREEK	7180	1/28	15	4.2	3.6	-		
BASIN CREEK FILLLOW	7180	1/28	SP	4.5	3.7	-		
BEACLE SPRINGS FILLLOW	8850	2/01	SP	2.4	5.5	-		
BEAR PAW SKI AREA	5200	1/29	7	.6	3.8	4.6		
BIG COULEE	5100	1/29	8	.8	2.2	4.9		
BIG SKY	7700	1/30	24	5.2	8.2	10.8		
BIG SPRINGS (ID)	6500	1/30	34	8.0	10.3	14.7		
BLACK BEAR	7950	1/29	63	16.8	23.6	27.4		
BLACK BEAR FILLLOW	7590	1/29	SP	16.2	20.3	25.0		
BLACK PINE	7100	2/02	14	3.1	5.9	9.4		
BLACK PINE FILLLOW	7100	2/02	SP	5.6	7.0	10.7		
BLOODY OICK	7600	2/01	EST	6.0	7.0	-		
BLOODY OICK FILLLOW	7600	2/01	SP	5.5	6.6	-		
BLUE LAKE	5900	1/29	28	8.5A	15.0	18.3		
BOULOER MOUNTAIN FILLLOW	7950	2/01	SP	5.7	11.7	-		
BOX CANYON FILLLOW	6670	2/01	SP	4.5	6.9	-		
BOXELDER CREEK	5100	1/29	8	1.2	3.8	5.3		
BRIDGER BOWL	7250	1/28	42	8.4	11.2	20.0		
BRIOICER BOWL FILLLOW	7250	1/28	SP	9.2	9.4	18.9		
CALVERT CREEK FILLLOW	6450	2/01	SP	3.4	5.0	7.7		
CAMP CREEK (ID)	6800	1/29	21	5.0	4.0	8.3		
CANYON (WY)	7750	2/02	28	4.9	9.0	11.4		
CARROT BASIN	9000	1/27	51	14.1	19.7	26.7		
CARROT BASIN FILLLOW	9000	1/27	SP	10.9	14.5	19.7		
CARTER CREEK	7400	1/29	1	.2	3.0	4.0		
CASHE CREEK FILLLOW	7800	2/01	SP	2.8	-	-		
CHESSMAN RESERVOIR	6200	1/30	2	.3	2.4	2.8		
CHICKEN CREEK	4060	1/27	30	7.6	8.1	-		
CLOVER MEADOW FILLLOW	8800	2/01	SP	8.2	9.2	-		
COLE CREEK	7850	1/29	20	6.5	11.2	12.5		
COLE CREEK FILLLOW	7850	1/29	SP	5.6	9.2	12.3		
COMBINATION	5600	2/02	1	.1	2.3	4.3		
COPPER BOTTOM	5200	2/02	SP	.6	3.0	4.4		
COPPER BOTTOM FILLLOW	5200	2/01	EST	2.4	5.0	-		
COPPER CAMP	6950	2/01	SP	3.8	5.5	10.5		
COPPER CAMP FILLLOW	6950	2/01	EST	14.0	19.0	-		
COPPER MOUNTAIN	7700	1/30	20	4.9	5.1	8.0		
COYOTE HILL	4200	1/30	13	3.2	5.9	8.1		
CRYSTAL LAKE FILLLOW	6100	2/01	SP	7.7	5.4	-		
DATSY PEAK	7600	1/28	18	4.4	5.0	-		
DALY CREEK	5780	1/27	16	4.5	7.8	8.5		
DALY CREEK FILLLOW	5780	1/27	SP	7.6	-	-		
DARKHORSE LAKE FILLLOW	8600	2/01	SP	11.0	-	-		
DEADMAN CREEK	6450	1/27	17	4.0	4.6	9.0		
DEADMAN CREEK FILLLOW	6450	1/27	SP	3.1	4.5	8.2		
DESERT MOUNTAIN	5600	2/04	25	7.9	7.1	11.6		
DEVILS SLIDE	8100	1/27	30	6.6	11.0	15.6		

SNOW		February 1, 1981		THIS YEAR			PAST RECORD	
DRAINAGE BASIN and/or SNOW COURSE		Elevation	Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (Inches)		
NAME						Last Year	Average	
DISCOVERY BASIN	7050	2/02	22	4.4	6.4	8.1		
DIVIDE	7800	2/01	EST	3.8	5.0	-		
DIVIDE PILLW	7800	2/01	SP	4.2	6.0	7.7		
DIX HILL	6400	2/01	20	3.6	5.2	8.2		
EAST ENTRANCE (WY)	7000	1/31	16	2.8	6.7	7.6		
EMERY CREEK	4350	2/04	29	8.0	6.1	11.9		
EMERY CREEK PILLW	4350	2/04	SP	8.2	6.9	-		
FISH CREEK	8000	1/28	16	4.0	3.8	-		
FISHER CREEK	9100	2/01	EST	16.0	22.5	28.0		
FISHER CREEK PILLW	9100	2/01	SP	15.1	22.0	26.6		
FLATTOP MOUNTAIN PILLW	6300	2/01	SP	26.4	28.8	35.2		
FOURTH OF JULY	3450	1/28	13	2.8	4.6	-		
FRIDAY HILL	4620	1/28	31	9.1	12.7	-		
FROHNER MEADOWS	6480	1/30	2	.5	4.8	6.2		
FROHNER MEADOWS PILLW	6480	1/30	SP	3.0	4.9	6.5		
GARVER CREEK	4250	2/03	24	6.6	7.2	9.1		
GARVER CREEK PILLW	4250	2/03	SP	7.5	8.0	8.1		
GIBBONS PASS	7100	2/01	37	11.2	12.4	16.7		
GRAVE CREEK	4300	2/03	23	6.8	8.3	13.7		
GRAVE CREEK PILLW	4300	2/03	SP	7.0	-	13.5		
GRIZZLY PEAK	8400	1/29	16	5.5	11.1	10.9		
HAND CREEK	5030	2/01	EST	5.0	7.0	-		
HAND CREEK PILLW	5030	2/01	SP	5.6	6.7	-		
HAWKINS LAKE	6450	2/03	47	17.1	21.0	23.0		
HAWKINS LAKE PILLW	6450	2/03	SP	16.0	19.5	22.1		
HEART LAKE TRAIL	4800	2/01	15	4.0	13.6	12.8		
HEBGEN DAM	6550	1/30	28	5.2	6.2	8.9		
HELL ROARING DIVIOE	5770	1/31	45	14.0	15.6	23.3		
HERRIG JUNCTION	4850	1/27	49	13.7	12.0	-		
HIGHWOOD DIVIDE	5650	1/29	9	1.2	4.4	7.5		
HICHWOOD STATION	4600	1/29	7	1.0	.0	4.2		
HOLBROOK	4530	2/01	6	1.5A	6.0	7.7		
HOOD MEADOW	6600	1/27	11	1.8	6.4	8.1		
HOODOO BASIN	6000	2/01	57	20.4	30.0	36.3		
HOODOO BASIN PILLW	6000	2/01	SP	17.0	28.0	34.6		
HOODOO CREEK	5900	2/01	47	16.6	27.3	32.5		
INTERCAARE	6450	1/31	13	3.0	4.6	6.2		
ISLAND PARK (IO)	6310	1/30	33	7.6	9.0	12.0		
JOHNSON PARK	6450	1/28	7	1.5	3.0	-		
KILGORE (ID)	6200	1/28	25	5.8	6.2	8.6		
KINGS HILL	7500	1/27	25	6.4	5.8	10.8		
KIWANIS CAMP	3720	1/29	6	.6	.8	1.3		
KRAFT CREEK PILLW	4750	2/01	SP	3.6	-	-		
LAKE CAMP (WY)	7780	2/02	17	3.1	5.1	6.4		
LAKEVIEW CANYON	6930	1/29	21	4.7	5.8	9.1		
LAKEVIEW RIDGE	7400	1/29	21	4.4	5.4	8.3		
LAKEVIEW RIDGE PILLW	7400	1/29	SP	6.5	5.0	-		
LEIGH RIDGE PILLW	8100	2/01	SP	3.1	5.5	7.0		
LICK CREEK	6860	1/27	7	1.4	6.8	7.1		
LICK CREEK PILLW	6860	1/27	SP	4.8	5.3	6.4		
LOLO PASS (ID)	5230	1/29	27	7.7	17.4	21.8		
LONE MOUNTAIN	8800	1/30	36	8.7	14.2	16.8		
LOOKOUT (IO)	5250	1/30	32	10.8	20.0	25.4		
LOWER TWIN PILLW	7900	2/01	SP	10.4	-	-		
LUBRECHT FLUME	4200	1/30	1	.2	3.4	4.5		
LUBRECHT FLUME PILLW	5450	1/30	SP	.2	2.7	4.3		
LUBRECHT FOREST # 3	5450	1/30	4	.6	3.2	5.9		
LUBRECHT FOREST # 4	4650	1/30	2	.3	2.2	3.1		

Missouri River & Hudson Bay Drainages

STREAMFLOW FORECASTS

BASIN, STREAM and/or FORECAST POINT	THIS YEAR				PAST RECORD			
	FORECAST		THOUSAND ACFT FEET		FORECAST		THOUSAND ACFT FEET	
	PERIOD	APRIL - SEPTEMBER	PERIOD	APRIL - JULY	PERIOD	APRIL - SEPTEMBER	PERIOD	APRIL - JULY
RED ROCK RIVER near Monida (1).....	82.0	75	113	110	76.0	74	102	103
BEAVERHEAD RIVER near Grant (2).....	95.0	56	193	171	86.0	58	162	148
BEAVERHEAD RIVER at Barnetts (2).....	143	63		226	120	61		196
RUBY RIVER near Alder.....	72.0	69		105	60.0	67		89.0
BIG HOLE RIVER near McElrose.....	480	61		792	450	62		730
BOULDER RIVER near Boulder.....	63.0	61	145	103	60.0	62	132	96.7
WILLOW CREEK near Harrison.....	10.0	46		21.5	9.0	47		19.2
MADISON RIVER near Grayling (3).....	360	69	432	523	280	68	328	409
MADISON RIVER near McAllister (4).....	615	69	751	892	490	69	646	706
GALLATIN RIVER near Gallatin Gateway.....	350	61		572	300	61		488
INFLW MIDDLE CREEK RESERVOIR near Bozeman (5).....	16.4	54		30.3	14.0	53		26.2
HYALITE CREEK near Bozeman (6).....	26.8	57		47.4	23.0	56		41.0
GALLATIN RIVER at Logan.....	260	40		649	220	39		557
MISSOURI RIVER at Toston (7).....	1,430	54	2,743	2,671	1,230	53	2,377	2,330
SHEEP CREEK near White Sulphur Springs.....	14.0	61		22.8	12.0	61		19.8
SUN RIVER at Gibson Dam (8).....	385	66	520	580	350	66	473	529
BELT CREEK near Monarch.....	78.0	53		146	70.0	52		134
MISSOURI RIVER at Fort Benton (9).....	2,020	49		4,148	1,750	48		3,640
TWO MEDICINE CREEK near Browning (10).....	175	68		259	165	68		244
BADGER CREEK near Browning.....	92.0	69		133	81.0	70		116
MARIAS RIVER near Shelby.....	346	60	481	577	320	60	444	532
MISSOURI RIVER at Virgelle (11).....	2,343	49		4,793	2,030	48		4,238
MISSOURI RIVER near Landusky (11).....	2,557	49		5,214	2,200	48		4,586
NORTH FORK MUSSELSHELL RIVER near Oelplene.....	3.5	55		6.4	2.9	53		5.5
SOUTH FORK MUSSELSHELL RIVER near Martinsdale.....	31.5	51		61.5	30.0	52		57.6
MISSOURI RIVER below Fort Peck Dam (11).....	2,383	48		4,929	2,050	47		4,381
MILK RIVER at Eastern Crossing.....	261	94		278*				
INFLW LAKE SASKAWAN, ND (11).....	7,400	55		13,450	6,700	55		12,239
SASKATCHEWAN RIVER BASIN								
SWIFTCURRENT CREEK at Sherburne (12).....	108	82	116	132	93.0	81	98.5	115
ST. MARY'S RIVER near Babb (12).....	412	83		498	350	82		426

*For the period March - September

MOUNTAIN SNOWPACK

Nearly all snow courses in the Gallatin River drainage have minimum snow water content of record. In other drainages, close to one-half of the courses are minimum of record. All others are near the lowest amount previously measured for this date. In most cases, previous lows were established in 1977.

Mountain precipitation was well below average in January. Almost no precipitation occurred in the first three weeks. One or two storms passed through the last week of January, dropping from 1 to 2 inches of moisture in most areas. Temperatures were well above average for the month.

The amount of water stored in the snowpack is generally 40 to 50 percent of average with only a few areas near 60 percent.

The St. Mary's River headwaters in Glacier National Park have a little better snow cover than the Missouri River drainage.

Soils under the snowpack have average or above average moisture. However, soils in lower elevations are drying.

All snow courses in the drainage will be measured near the first of March. At that time, the extent and severity of the snowpack deficiencies will be evaluated.

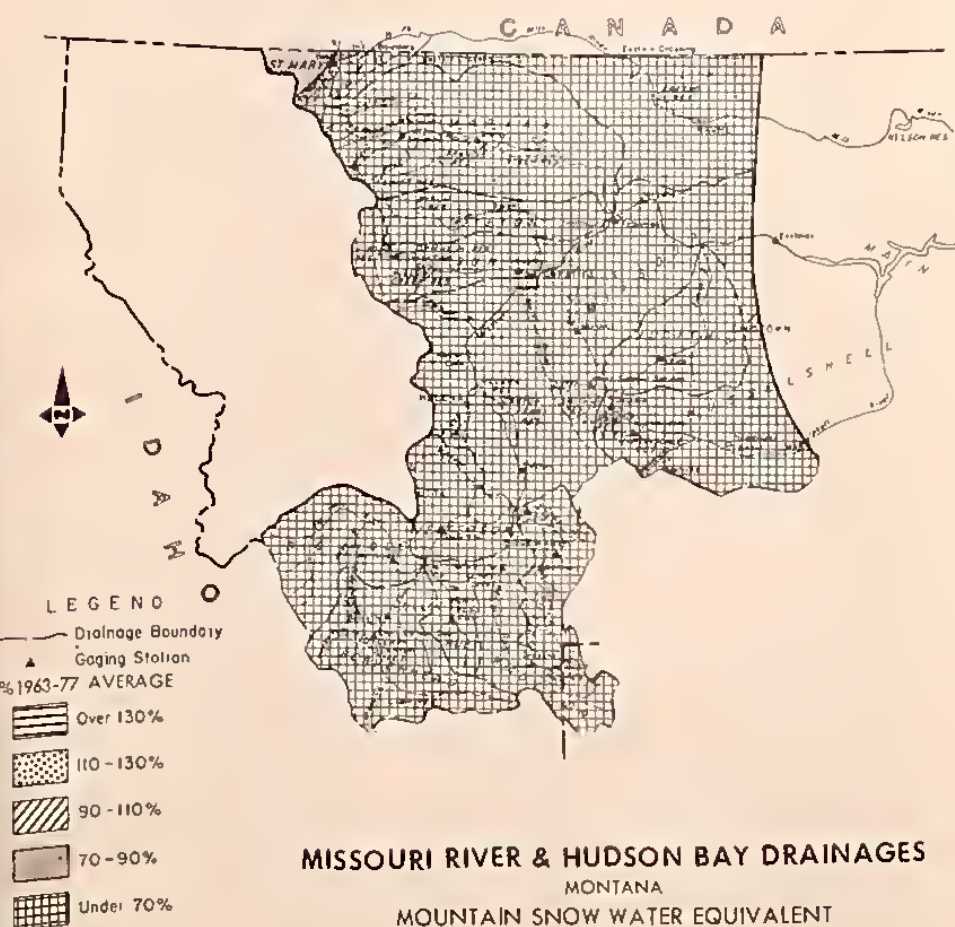
SUMMARY OF SNOW MEASUREMENTS

RIVER BASIN and/or SUBWATERSHED	Number of Courses	THIS YEAR'S SNOW WATER AS PERCENT OF 1963-77 AVERAGE	
		Less Than	Average
Beaverhead.....	10	74	59
Ruby.....	4	76	49
Big Hole.....	7	85	58
Boulder.....	12	67	50
Jefferson.....	33	75	55
Madison.....	17	74	55
Gallatin.....	15	66	45
Missouri Headwater	65	73	52
West-Side Missouri (Toston-Cascade)	8	73	55
Smith & Belt.....	5	108	57
Missouri Main-stem	13	88	56
Teton & Sun.....	2	43	33
Marias.....	3	72	57
Marias-Teton-Sun	5	64	50
Judith.....	3	120	64
Musshells.....	5	108	57
Judith-Musshells	8	113	60
Milk.....	7	53	37
Bear Paws.....	7	43	29
Missouri (Total).....	98	76	53
SASKATCHEWAN			
St. Mary's.....	2	87	69
Bow River in Alberta.....	5	106	117

STREAMFLOW FORECASTS

Water supply forecasts have been lowered considerably by the lack of snow in January. With the exception of the Milk River, all drainages are expected to have well below average runoff. Most headwater streams are expected to produce between 60 and 70 percent of average spring and summer runoff while the Missouri River runoff is forecast to be about one-half of average. The actual runoff has been lower than the present forecasts in only three to five years out of the past 50 years. These low runoff years were in the mid 1930's, 1960, 1961 and 1977.

Unless there is a reversal in weather patterns over the next two months, moderate to severe water shortages can be expected to occur by late June on all drainages not having reservoir storage. Those who depend on the water supply from natural streamflow should begin thinking of ways to operate with a runoff deficiency this season.



Many south-facing slopes are now bare from warm temperatures and lack of snowfall in the mountains.

Yellowstone River Drainage

STREAMFLOW FORECASTS

BASIN, STREAM and/or FORECAST POINT	THIS YEAR				PAST RECORD			
	FORECAST		THOUSAND ACFT FEET		FORECAST		THOUSAND ACFT FEET	
	PERIOD	April - September	PERIOD	April - July	PERIOD	April - September	PERIOD	April - July
YELLOWSTONE RIVER at Corwin Springs.....	1,450	69	1,626	2,102	1,200	69	1,326	1,749
YELLOWSTONE RIVER near Livingston.....	1,575	64		2,471	1,295	63		2,048
BOULDER RIVER at Big Timber.....	245	59		416	230	60		382
STILLWATER near Absarokee (1).....	418	63		660	346	62		555
CLARK'S FORK RIVER near Belfry.....	430	67		644	390	69		564
ROCK CREEK near Red Lodge.....	83.0	70	131	118	63.0	69	104	91.4
INFLW COONEY RESERVOIR near Boyd (2).....	28.0	43		64.5	21.0	40		52.5
YELLOWSTONE RIVER at Billings.....	2,889	62	3,969	4,682	2,450	62	3,377	3,979
BIGHORN RIVER near St. Xavier (3).....	1,357	67	1,611	2,034	1,250	67	1,457	1,861
LITTLE BIGHORN RIVER near Hardin.....	148	76		196	130	75		174
YELLOWSTONE RIVER at Miles City (4).....	4,437	62		7,142	3,850	62		6,243
YELLOWSTONE RIVER near Sidney (5).....	4,810	62		7,806	4,200	62		6,805

- Adjusted for storage in Lima Reservoir.
- Adjusted for storage in Lima & Clark Canyon Reservoirs.
- Adjusted for storage in Hobgen Lake.
- Adjusted for storage in Hobgen Lake & Ennis Lake.
- Sum West Fork Hyalite Creek & East Fork Hyalite Creek above the reservoir.
- Adjusted for storage in Middle Creek Reservoir.
- Adjusted for storage in Lima Hobgen, Ennis, & Clark Canyon Reservoirs.
- Adjusted for storage in Gibson Reservoir & diversions.
- Adjusted for storage in Lima, Clark Canyon, Hobgen, Ennis, Gibson, Plushun, Willow Creek, & Canyon Ferry.
- Adjusted for storage in Two Medicine Reservoir & diversions in Two Medicine Canal.
- Adjusted for all upstream reservoirs.
- Adjusted for storage in Lake Sherburne.

ALL FORECASTS PREPARED IN COOPERATION WITH THE NATIONAL WEATHER SERVICE

STREAMFLOW FORECASTS

Streamflow forecasts have been lowered from last month because of low snowfall during January.

Presently most streams are forecast to have spring and summer runoff in the 60 to 70 percent of average range.

Over the past 50 years, only five or six years have had less runoff than is forecast this year. On most streams these occurred in the early 1940's, early 1960's and in 1977.

Unless there is a drastic change in weather patterns over the next two months, moderate to severe water shortages are expected to develop by late June. Those who depend on streamflow for their operations should begin thinking of ways to minimize the impacts of short water supply.



The mild winter has been easy on wildlife. The lack of snow has permitted many animals to winter much higher than usual.

MOUNTAIN SNOWPACK

All headwater areas have below average snowpack. Many snow courses have record low water content for this date. Generally, most snow courses show that water stored in the snowpack is only 40 to 50 percent of average.

January was a poor snowfall month with most storm activity during the last week. Temperatures were well above average for the month.

Soils under the snowpack have about average levels of stored moisture. Soils in lower elevations are drying.

Near the first of March, all snow courses in the drainage will be surveyed. This will provide a complete picture of how severe and extensive the snow shortage will be this season.

SUMMARY OF SNOW MEASUREMENTS

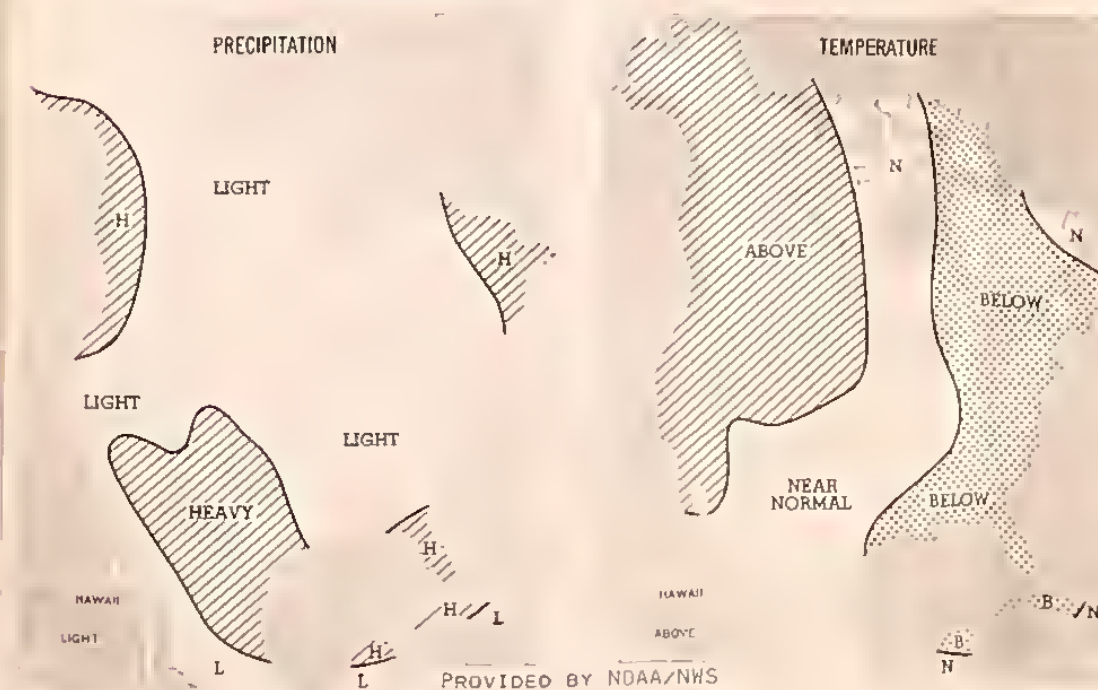
RIVER BASIN and/or SUBWATERSHED	Number of Courses	THIS YEAR'S SNOW WATER AS PERCENT OF 1963-77 AVERAGE	
		Less Than	Average
Upper Yellowstone	14	67	48
ab Livingston...	4	78	45
Shields.....			
Boulder 6			
Stillwater.....			
Rock Creek & Clark's Fork....	9	61	48
Yellowstone (ab Bighorn River)...	27	67	47
Bighorn/Wyoming...	23	62	56
Little Bighorn....	4	58	41
Bighorn (Total)...	27	62	54
Tongue.....	10	65	48
Powder.....	7	62	54
Yellowstone (Total).....	71	63	49

CANADA



average monthly weather outlook

FOR FEBRUARY 1981



DID YOU GET YOUR MAP LAST MONTH?

We did not provide enough maps to our printer, so some of you may not have received a map of snow course sites in your January 1, 1981, Water Supply Outlook.

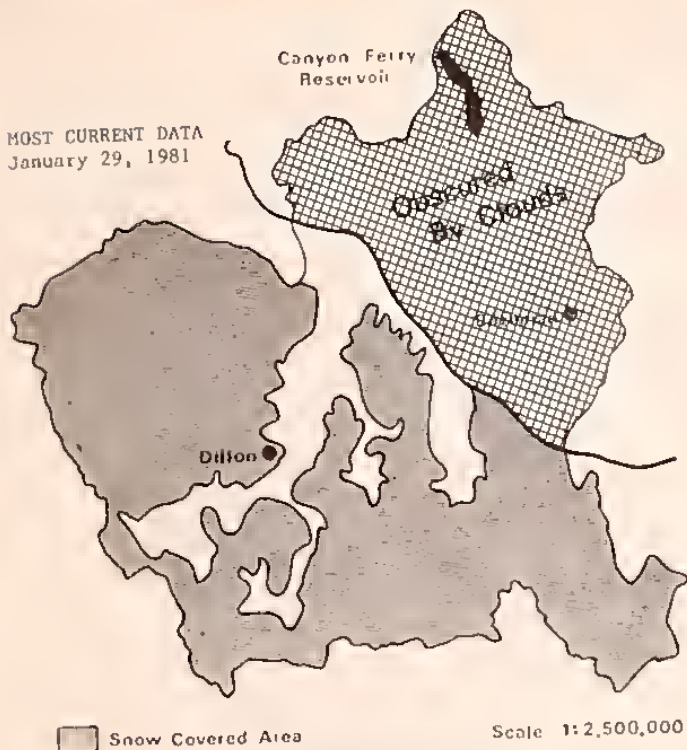
If you need a copy, you may request one from:

Snow Survey Supervisor
Soil Conservation Service
P. O. Box 98
Bozeman, MT 59715

You may also telephone your request to 406-387-5271, Ext. 4270.

We are sorry for any inconvenience this may have created.

SATELLITE SNOW COVER



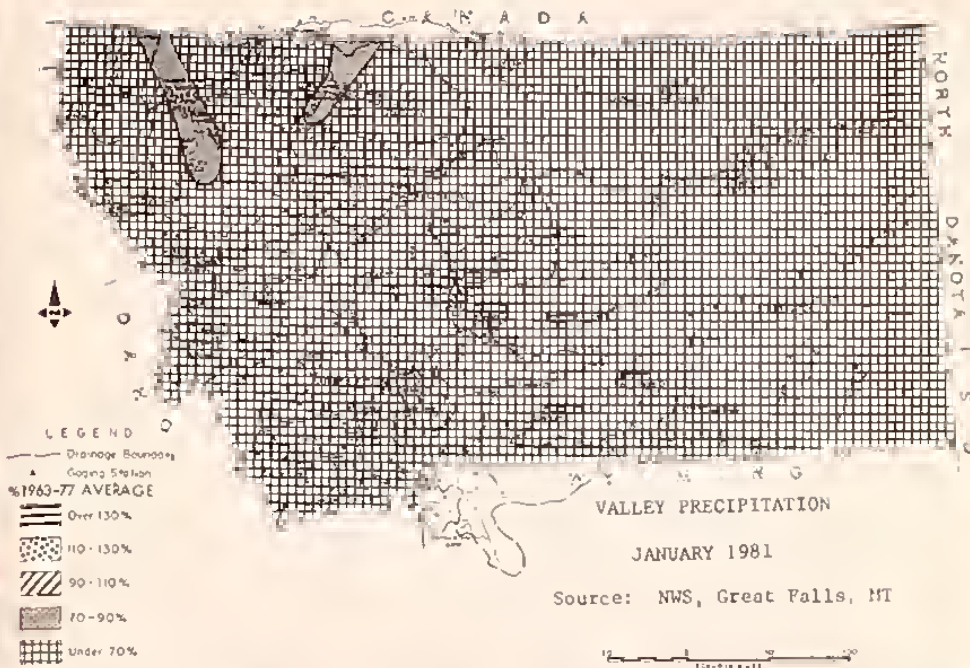
MISSOURI RIVER BASIN
Above
Canyon Ferry Dam

DATE	PERCENT SNOW COVER	AVERAGE SNOWLINE ELEVATION IN FEET
November 5, 1980	8	8670
November 16, 1980	94	4450
November 23, 1980	78	5440
November 26, 1980	75E	5590
December 1, 1980	100	3850
December 7, 1980	87	4950
December 13, 1980	55E	6450
December 28, 1980	41	6980
December 31, 1980	31	7370
January 7, 1981	31	7370
January 10, 1981	32	7330
January 18, 1981	37	7120
January 29, 1981	75E	5590

DATA PROVIDED BY NOAA/NESS

RESERVOIR STORAGE (Thousand Acre Feet) END OF MONTH

Division or Stream	RESERVOIR	Ultimate Capacity	Useful Storage		
			This Year	Last Year	Average
COLUMBIA					
Kootenai	Koocanusa	5,694.0	2,858.0	2,321.0	--
Flathead	Hungry Horse	3,428.0	2,829.0	2,039.0	2,341.0
	Flathead Lake	1,791.0	1,185.0	791.0	1,253.0
	Camas (4)	45.2	23.2	16.0	20.7
	Mission Valley (8)	100.3	34.7	25.6	37.0
Clark Fork	Georgetown Lake	31.0	29.6	26.2	27.3
	Lower Willow Creek	4.9	1.9	1.2	1.6
	Nevada Creek	12.6	5.8	--	5.0
	Noxon Rapids	334.6	318.6	292.3	315.2
Bitterroot	Painted Rocks	31.7	--	--	17.6
	Como	34.9	24.1	--	11.3
MISSOURI					
Beaverhead	Lima	84.0	48.3	10.2	39.5
	Clark Canyon	257.2	161.9	144.8	135.9
Ruby	Ruby	38.8	--	--	24.3
Madison	Hebgen Lake	377.5	276.4	277.5	241.5
	Ennis Lake	41.0	29.9	34.7	35.3
Gallatin	Middle Creek	8.0	3.8	2.9	3.3
Missouri	Canyon Ferry	2,043.0	1,717.0	1,504.0	1,661.0
	Hauser & Helena	61.9	63.0	64.2	60.2
	Lake Helena	10.4	10.9	11.3	9.9
	Holter Lake	81.9	81.9	75.3	70.8
	Fort Peck Lake	18,910.0	15,140.0	16,160.0	15,570.0
Smith	Smith River	10.6	5.6	6.2	6.7
	Newlan Creek	12.4	9.7	8.6	--
Musselshell	Bair	7.0	3.5	4.8	4.4
	Martinsdale	23.1	10.6	11.1	9.9
	Deadman's Basin	72.2	--	--	46.8
Sun	Gibson	99.0	56.8	31.3	41.4
	Willow Creek	32.2	19.2	23.3	21.2
	Pishkun	32.0	19.4	18.9	16.5
Marias	Lower Two Medicine	11.9	--	--	6.2
	Four Horns	19.2	--	--	13.2
	Swift	30.0	18.9	--	14.3
	Lake Frances	111.9	79.6	--	70.9
Milk	Elwell (Tiber)	1,347.0	538.5	528.5	540.8
	Beaver Creek	3.5	1.3	2.6	1.5
	Fresno	127.2	38.7	45.1	65.4
	Nelson	66.8	22.2	42.1	43.3
HUDSON BAY					
St. Mary's	Lake Sherburne	66.2	35.8	17.1	20.1
YELLOWSTONE					
Stillwater	Mystic Lake	21.0	6.0	4.9	10.0
Clark's Fork	Cooney	27.4	14.6	14.3	14.6
Tongue	Tongue River	68.0	--	14.1	32.5
Bighorn	Bighorn Lake	1,356.0	907.5	936.3	536.0



ACID PRECIPITATION

Montana snow surveyors are measuring the pH of snow this winter. Mt. St. Helen's eruption last spring created many concerns related to the ash that covered areas in the Northwest. One of the concerns was related to its effect on the pH of precipitation and subsequent runoff.

There is also concern over the possibility of acid precipitation in the western watersheds similar to those found in eastern areas of the United States and in other parts of the world.

Likewise, changes in the pH of snow-fall or rain could change the pH of streams which could in turn adversely affect crops irrigated with this water, fisheriea, industry, and municipalitiea.

In attempting to find answers to questions on "normal" pH of anow, it became very evident that very little data existed on what might be considered a normal range of pH for anow-fall and precipitation in the mountainous watersheds of Montana.

Monitoring any changes in pH that would occur with another eruption and determining normal levels of pH and variation across Montana would require frequent sampling.

Since many snow surveyors travel to snow course locations about the same time each month, it was decided that

pH measurements made in conjunction with anow surveys would provide an extensive data baas at minimal cost. Field determination of the pH of surface snow will be made at approximately one-half of the snow courses each month. Weather maps will be used to determine storm tracks.

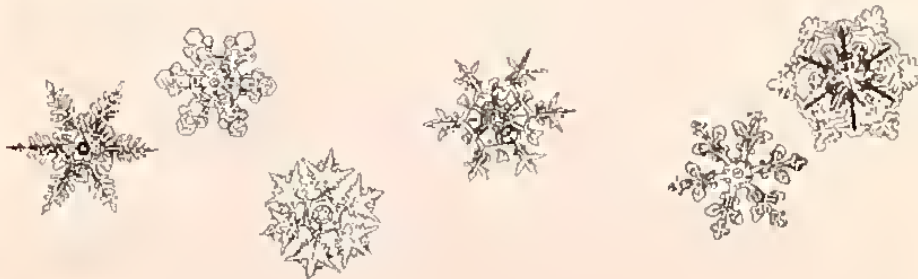
To date, approximately 100 pH readings have been taken. Most fall in the range of 5.3 to 5.9 pH. However, values aa low as 4.4 and as high as 6.5 have been observed.

Values less than 7.0 are acidic while those above 7.0 are alkaline. A pH of 4.0 is ten times more acid than a pH of 5.0 and 100 times more acid than 6.0.

"Normal" rainfall is generally considered to be about 5.6 pH. When the pH of precipitation drops below 5.0, it is considered to be "critical." Rainfall in the eastern United States now averages about 4.5 while precipitation between 5.0 and 6.0 is common for the western United States.

By comparison, distilled water has a pH of 7.0, milk is about 6.0, orange juice is between 4 and 5, and lemon juice between 2 and 3.

Data from this season will be tabulated and analyzed and made available to those already involved in studies of acid precipitation.



AGENCIES & ORGANIZATIONS COOPERATING
in Montana Snow Surveys

GOVERNMENT AGENCIES

State
Bureau of Census, Department of the Environment, Calgary
Bureau of Resources, Department of Land, Forests, and
Wildlife, Edmonton, British Columbia
Alberta Environment, Edmonton, Alberta
United States
Department of
Army, Corps of Engineers
Agriculture, Forest Service
Soil Conservation Service
Commerce, National Environmental Statistics Service
National Weather Service
Department of Home Affairs
Bureau of Indian Affairs
Fish & Wildlife Service
Geological Survey
National Park Service
Water & Power Resources Service

STATE OF MONTANA

Department of Wildlife
Department of Fish, Wildlife & Parks
Department of Land, Forests & Conservation
Agricultural Experiment Station
University of Montana School of Forestry
Wolf Springs

PRIVATE ORGANIZATIONS & INDIVIDUALS

Billy Wren Company
Montana Power Company
The Montana Company
Big Sky, Montana
Joni & Scott Swanson
Lewistown, Montana
Joni Swanson

